

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
4 September 2003 (04.09.2003)

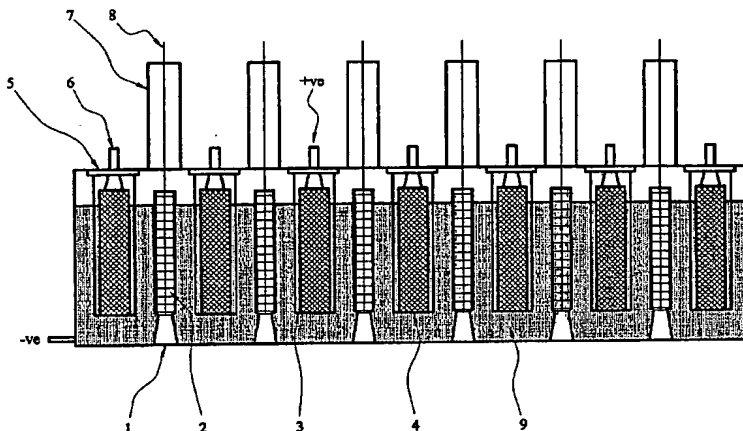
PCT

(10) International Publication Number  
WO 03/073436 A1

- (51) International Patent Classification<sup>7</sup>: G21C 19/42, C25C 3/34
- (21) International Application Number: PCT/GB03/00792
- (22) International Filing Date: 24 February 2003 (24.02.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
0204671.2 28 February 2002 (28.02.2002) GB
- (71) Applicant (for all designated States except US): **BRITISH NUCLEAR FUELS PLC** [GB/GB]; Risley, Warrington, Cheshire WA3 6AS (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **LEWIN, Robert, Glyn** [GB/GB]; British Nuclear Fuels Plc, Sellafield, Seascale, Cumbria CA20 1PG (GB). **THIED, Robert, Charles** [GB/GB]; British Nuclear Fuels Plc, Sellafield, Seascale, Cumbria CA20 1PG (GB).
- (74) Agent: **HARRISON GODDARD FOOTE**; Belgrave Hall, Belgrave Street, Leeds LS2 8DD (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: ELECTROCHEMICAL CELL FOR METAL PRODUCTION



(57) **Abstract:** The invention provides a process for reducing to metallic form metal oxides, the process comprising cathodically electrolyzing the oxide in the presence of a molten salt electrolyte whilst controlling the potential of the cathode so as to favour oxygen ionisation over deposition of metal from the cations present in the molten salt, and an apparatus for performing the said process, the said apparatus being free from bolted or screwed fittings and comprising an electrochemical cell which comprises a body or housing, a cathode container, and a cathode connector, wherein said body or housing is maintained as the cathode. The process provides a single electrochemical process to reduce the metal oxide fuel to a metallic form, with oxygen produced as the only by-product, and offers a more practical, efficient and financially viable means for the production of metal from oxides than is available from the prior art. The metallic solid which is produced can be removed or used directly as the feed for an electrorefining process. In an alternative embodiment, the electrolytic ionisation of oxygen and the electrorefining processes are carried out in the same cell and the same salt system.

BEST AVAILABLE COPY

WO 03/073436 A1